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Attachment Representation and Cortisol Response to the Adult Attachment Interview in Idiopathic Spasmodic Torticollis

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Key Words

Adult Attachment Interview · Cortisol · Psychological stress · Neuro-endocrine function · Idiopathic spasmodic torticollis

Abstract

Objective: The study investigates individual differences in the mental representation of attachment and their impact on the cortisol response to psychosocial stress in idiopathic spasmodic torticollis (IST). It was hypothesized (a) that in IST insecure attachment is more prevalent than in a non-clinical control group and (b) that subjects with dismissing attachment respond with higher physiological arousal to a specific stimulus activating the attachment behavioural system than subjects with secure attachment. **Method:** 20 patients with IST and 20 healthy controls matched for age and sex underwent the Adult Attachment Interview, an hour-long, semiclinical interview on attachment experiences. During the interview salivary cortisol levels were monitored. The subjects' mental state with regard to attachment was classified using the attachment Q-sort method. Anxiety and

depression were measured as potential covariates of the adrenocortical stress response. **Results:** Compared to the non-clinical group, dismissing attachment was strongly overrepresented in IST. In IST, but not in the healthy control group, dismissing attachment correlated with an elevated cortisol response to the interview. **Conclusion:** In clinical, but not in non-clinical samples dismissing attachment may be associated with increased vulnerability to psychosocial stress. The factors contributing to this interaction are not yet fully elucidated.

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Introduction

Research on the psychobiology of attachment has provided evidence that the formation and disruption of social relationships has important physiological consequences. The physiological processes, which were observed subsequently to separation in young primates, include changes in body temperature, heart rate, endocrinology, immune function, body weight and sleep patterns [1–6].

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Considering the psychobiological aspects of attachment in humans, Bowlby [7] suggested that the attachment behavioural system is interrelated with physiological systems in a sequential-hierarchical manner: changes on the physiological level occur if the behavioural adaptation to changes in the environment is insufficient. Physiological arousal in response to separation according to this hypothesis indicates that cognitive and behavioural coping strategies are exhausted.

Evidence from developmental psychology points out that during the early stages of development the regulation of physiological processes depends on the quality of the attachment relationship to a primary care provider. Particularly maternal sensitivity has been demonstrated to influence the infant's physiological response to stress. At the age of 3–6 months during periods of free play and exploration children of less sensitive mothers showed significantly higher levels of salivary cortisol than children of sensitive mothers [8]. At the age of 12 months, observations during a 'strange situation' [9] indicate that infants with insecure avoidant attachment behaviour have higher levels of salivary cortisol in response to separation than securely attached infants [10, 11]. In adults, studies investigating the link of attachment and the psychophysiological response to stress report that subjects with dismissing attachment show a significantly higher increase in the level of skin conductance while answering questions referring to separation, rejection or threat from the parents than subjects with secure attachment [12]. Furthermore heart rate and blood pressure levels were elevated in insecure avoidant and insecure ambivalent subjects during a stressful laboratory task, when their romantic partners were present [13]. These findings suggest that insecure attachment is a covariate of the psychophysiological response to stress and should be considered as a risk factor predisposing to physical illness.

Idiopathic spasmodic torticollis (IST) is a rare neurological disorder, which is characterized by a tonic or phasic involuntary activity of the neck muscles resulting in an abnormal head movement or head position. The etiology of IST is still unknown. Electrophysiological studies, brain imaging and biochemistry have suggested that a functional disturbance of the basal ganglia plays an important role [14–16]. The illness is associated with considerable psychosocial distress resulting in psychological dysfunction and social withdrawal in a substantial proportion of patients [17, 18]. Psychiatric interviews with IST patients lead to the observation of a striking lack of biographical memories and an inability to access emotionally relevant interpersonal experiences [19]. These findings

may be conceptualized in terms of attachment theory suggesting a high prevalence of insecure attachment representation in this clinical group. Therefore, in the present study it was hypothesized (a) that insecure dismissing attachment in IST is more prevalent than in a non-clinical control group and (b) that subjects with dismissing attachment under psychosocial stress, particularly when the latter is specifically activating the attachment behavioural system, respond with higher physiological arousal than subjects with secure attachment. The study intends to contribute to the understanding of the links between attachment representation and psychobiological vulnerability investigating a rare and still poorly understood neurological illness. Insecure dismissing attachment in this clinical condition is considered as a central feature of the psychopathology.

Method

Subjects and General Study Outline

20 patients with IST and 20 healthy controls matched for age and sex participated in the study. IST patients were recruited from a sample of 44 patients attending the movement disorder unit of the Freiburg Neurological University Hospital, which provides a clinic for the treatment with botulinum toxin. The mean age of the participating patients, 10 women and 10 men, was 46.5 years ($SD = 10.7$). This is slightly younger than the mean age of other IST samples reported in the literature [20]. The control group was found by an advertisement in the local newspaper. The mean age of the control group amounted to 45.8 years ($SD = 9.8$). Both groups were invited to take part in a study on the physiological response to an interview on attachment experiences. Treatment with steroids, endocrinological disease, pregnancy, current use of contraceptives and current psychiatric treatment were considered as exclusion criteria. All participants gave their written consent before entering the study. For the completion of the half-day experiment the participants received 45 DM compensation.

All experiments were conducted between 12 a.m. (beginning) and 2 p.m. (end) in order to minimize the effects of the time of day on the cortisol response. Two weeks before the experiment all participants received a letter with detailed information on the time schedule of the study. Participants were asked to refrain from smoking, eating and from physically exhausting exercise 2 h prior to the interview.

In each group, IST and controls, saliva sampling was insufficient in 1 subject. These subjects were removed from all statistical analyses, which included cortisol measures. While the total sample included 40 subjects, statistical analyses of the cortisol measures refer only to 38 subjects, 19 IST patients and 19 healthy controls.

Adult Attachment Interview and Classification

The Adult Attachment Interview (AAI) [21] is a semistructured, semiclinical interview, focusing upon attachment experiences in childhood and their effects on later personal development. The interview requires a coherent and objective account of personal experiences with attachment figures. A speaker's state of mind with respect

to attachment is classified as 'secure' or 'free to evaluate' if the speaker shows indications of valuing attachment relationships and experiences; the presentation of these experiences is internally consistent and responses to the questions of the interview are clear, relevant and succinct. A speaker's state of mind with regard to attachment is classified as insecure and 'dismissing' when access to early attachment experiences is restricted and insistence upon lack of memory for childhood is a predominant feature of the narrative. Transcripts are judged insecure and 'preoccupied' when the speaker exhibits a confused, angry or passive enmeshment talking about the experiences with attachment figures. Two psychologists, who were familiar with the Main and Goldwyns Interview and Classification Scoring System [22], coded the interview transcripts. The hour-long interview was transcribed verbatim and blinded with respect to clinical status. Before entering the study the coders were trained rating 3 test cases. The classification of these cases was controlled for agreement with the Main and Goldwyns rating method. Items of the AAI Q-sort [23] for each interview were distributed into 9 categories ranging from most characteristic (9) to least characteristic (1). All sorts thus have a forced bell-shaped distribution with 5 items in the two extreme categories and 18 items in the category neither characteristic nor uncharacteristic. Each subject's Q-sort description was then correlated with the 4 prototype sorts resulting in a score for secure, dismissing, preoccupied and deactivation versus hyperactivation of attachment. The composite reliability of the prototypic Q-sorts rated by experts ranged from $r(100) = 0.92$ to $r(100) = 0.96$ [24]. The interrater reliability of the two coders in the present study amounted to 0.72 (Spearman Brown) with a range from 0.56 to 0.97. The classification of attachment groups was based on the correlation of the combined scores of both coders with the criterion sorts. Subjects whose Q-sort correlated positively with the prototype of secure attachment were allocated to the secure group; subjects whose Q-sort correlated negatively with the prototype of secure but positively with that of dismissing (deactivating) attachment were allocated to the dismissing category; subjects whose Q-sort correlated positively with a preoccupied attachment strategy and negatively with secure attachment were allocated to the insecure preoccupied group.

Saliva Cortisol Sampling and Biochemical Analysis

The AAI served as the stimulus of the adrenocortical stress response. Saliva cortisol was used as biological marker [25, 26]. Seven saliva samples were collected from each patient before, during and after the interview. The time intervals between the cortisol measures were selected taking the latency of the HPA axis response into account. The first sample was collected 30 min before the interview (t_{-30}), the second at the beginning of the interview (t_0), the third 30 min after the start of the interview (t_{30}), the fourth 60 min after the start of the interview (t_{60}) and the following 3 samples in time intervals of 10 min after termination of the interview (t_{70} , t_{80} , t_{90}). The average of t_{-30} and t_0 is used as the cortisol baseline.

In addition 2 reference samples were collected from each subject on another day (at 8 a.m. and at 12 p.m.) in order to determine morning cortisol and the cortisol level at the time of the interview independently of the test situation. The saliva samples were obtained with the Salivette (Sarstedt, Rommelsdorf, Germany) sampling device. All saliva samples were stored at -20°C until cortisol analysis. Cortisol levels were determined employing a time-resolved immunoassay with fluorometric end-point detection (DELFI) [27]. The lower detection limit of this assay is less than 0.43 nM. To reduce error

variance caused by interassay imprecision, all samples from one subject were assayed in the same run.

Questionnaire Measures

In order to examine other psychological variables such as anxiety or depression as covariates of the cortisol response the SCL-90R [28, 29] was used as a screening instrument. Subjects assess a range of psychiatric symptoms on a 5-point scale. The 9 dimensions of the scale are labelled as follows: SL 1 = somatization; SL 2 = obsessive-compulsive symptoms; SL 3 = interpersonal sensitivity; SL 4 = depression; SL 5 = anxiety; SL 6 = hostility; SL 7 = phobic anxiety; SL 8 = paranoid ideation; SL 9 = psychoticism. The general symptom index, composed of the arithmetic mean of the item answers (total sum score by total number of items) serves as a global measure of the severity of psychological distress.

The Toronto Alexithymia Scale (TAS-20) was used in order to study difficulties in experiencing and expressing emotions as a potential covariate of the physiological response. The TAS-20 is a widely used self-report measure of alexithymia. 20 items describing emotional behaviour according to the construct of alexithymia are presented in a 5-point Likert rating format. Factorial analysis yielded three dimensions, which are theoretically congruent with the alexithymia concept: difficulty identifying feelings (factor 1; 7 items); difficulty describing feelings (factor 2; 5 items); externally oriented thinking (factor 3; 8 items). The excellent psychometric properties of the scale (internal consistency, test-retest reliability and external validity) have been demonstrated recently [30, 31].

Neurological Assessment (IST Group)

The treating physicians documented the neurological symptoms of the IST patients on a standardized form. The neurological assessment was included in order to control for physical symptoms as covariates of the cortisol response. The postural abnormality of the head in different planes (rotation, laterocollis, anteroretrocollis) and the Tsui index [32] served as a measure of severity. The deviation of the head was evaluated according to 4 categories (0° , $<15^\circ$, $15-30^\circ$, $>30^\circ$) in 3 planes.

Data Reduction and Statistical Analysis

The statistical analysis focused on the initial cortisol response to the interview. A cortisol score was computed contrasting baseline level and the cortisol response at t_{30} according to the formula $t_{30} - [(t_{-30} + t_0)/2]$. We refer to this measure as initial cortisol response (ICR). A two-way analysis of variance (clinical status by attachment group) was computed including the ICR as dependent variable. In a second step other psychological measures such as the anxiety and depression subscales of the SCL-90R were entered into the ANOVA as covariates in order to control their effect on the cortisol response.

Results

Descriptive Data for Attachment Dimensions and Attachment Groups

Each subject's interview Q description was correlated with the prototype sorts. Pearson correlation coefficients of the interviews with the secure prototype ranged from

Table 1. Means and standard deviations of attachment groups in the four attachment dimensions

Attachment dimension	Attachment group			χ^2	Post hoc test
	secure (S) (n = 17)	dismissing (D) (n = 17)	preoccupied (P) (n = 6)		
Secure	0.47 ± 0.23	-0.35 ± 0.22	-0.04 ± 0.05	32.0*	S>D; S>P; P>D
Dismissing	-0.37 ± 0.18	0.45 ± 0.19	-0.06 ± 0.08	31.5*	D>S; P>S; D>P
Preoccupied	-0.15 ± 0.19	-0.01 ± 0.13	0.29 ± 0.11	16.5*	P>S; D>S; P>D
Deactivation	-0.15 ± 0.13	0.35 ± 0.13	-0.13 ± 0.14	28.6*	D>S; P>D; D>P

χ^2 : Kruskal-Wallis one-way ANOVA; post hoc: Mann-Whitney U test; * p < 0.001.

Table 2. Mean absolute cortisol levels (± SEM) of attachment groups in IST and controls

Attachment group	Cortisol, nmol/l						
	t ₋₃₀	t ₀	t ₃₀	t ₆₀	t ₉₀	t ₁₀₀	t ₁₁₀
Secure							
IST	13.7 (± 5.4)	9.1 (± 6.8)	7.3 (± 3.2)	7.0 (± 2.1)	6.8 (± 2.2)	7.1 (± 1.9)	7.6 (± 2.9)
Control	9.4 (± 4.2)	10.5 (± 7.2)	11.1 (± 6.8)	9.0 (± 5.1)	8.7 (± 4.7)	9.0 (± 5.6)	8.7 (± 3.4)
Dismissing							
IST	11.8 (± 4.4)	9.4 (± 3.0)	15.5 (± 6.5)	14.1 (± 8.2)	11.2 (± 6.8)	11.8 (± 7.8)	12.1 (± 8.5)
Control	14.7 (± 11.4)	12.8 (± 8.4)	10.4 (± 6.5)	7.6 (± 5.0)	7.2 (± 4.2)	7.2 (± 4.4)	7.9 (± 5.5)
Preoccupied							
IST	8.5 (± 1.7)	7.2 (± 1.2)	5.7 (± 0.1)	5.0 (± 2.3)	5.5 (± 1.7)	5.6 (± 1.7)	2.3 (± 2.3)
Control	12.3 (± 2.8)	9.8 (± 2.2)	12.3 (± 3.0)	10.9 (± 7.6)	9.3 (± 6.1)	8.8 (± 6.3)	7.5 (± 6.7)

-0.73 to 0.76, with the dismissing prototype from -0.59 to 0.81, with the preoccupied prototype from -0.47 to 0.48 and with the deactivation prototype from -0.39 to 0.63 (table 1).

Of the total sample 17 subjects were classified as secure, 17 as dismissing and 6 as preoccupied. Differences between the three attachment groups were tested by Kruskal-Wallis one-way ANOVAs and post hoc Mann-Whitney U tests ($p < 0.05$). Table 1 shows that the three attachment groups differed significantly on all four Q-sort dimensions (secure, dismissing, preoccupied, deactivation). Post hoc tests indicated that only deactivation did not differ between all three of the attachment groups.

Comparison of Attachment Representations in IST and Controls

Insecure attachment representations clearly outweighed in IST ($\chi^2 = 3, 68$; d.f. = 1, $p = 0.055$): 55% of the IST patients compared to 30% of the control group were

allocated to the dismissing attachment category; 20% of the IST patients compared to 10% of the control group were allocated to the preoccupied attachment category. Only 25% of the IST patients but 60% of the control group were rated as secure (fig. 1).

Saliva Cortisol Response to the AAI in IST and Controls

Table 2 gives the mean absolute cortisol levels of the three attachment groups for IST and controls separately. Cortisol levels at t₋₃₀ and t₀ did not differ significantly between the two groups. Morning cortisol (nmol/l) on another day at 8 a.m. and at 12 a.m. amounted to 22.6 (SD 9.7) and to 11.3 (SD 9.00) in IST patients and to 17.2 (SD 11.1) and 7.4 (SD 4.9) in the control group. Neither morning cortisol nor the cortisol level at 12 a.m. on another day differed significantly between IST patients and controls.

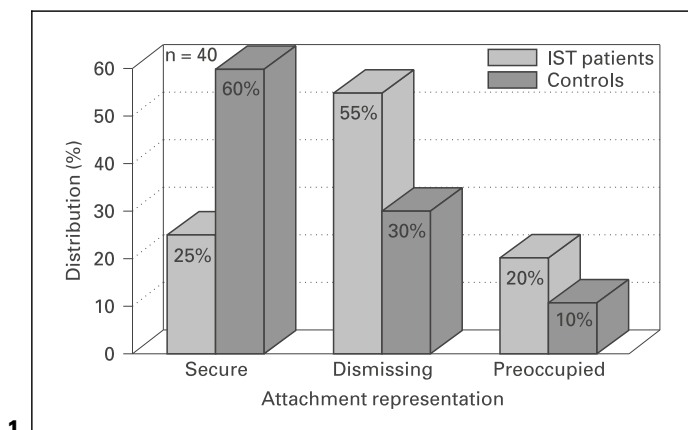
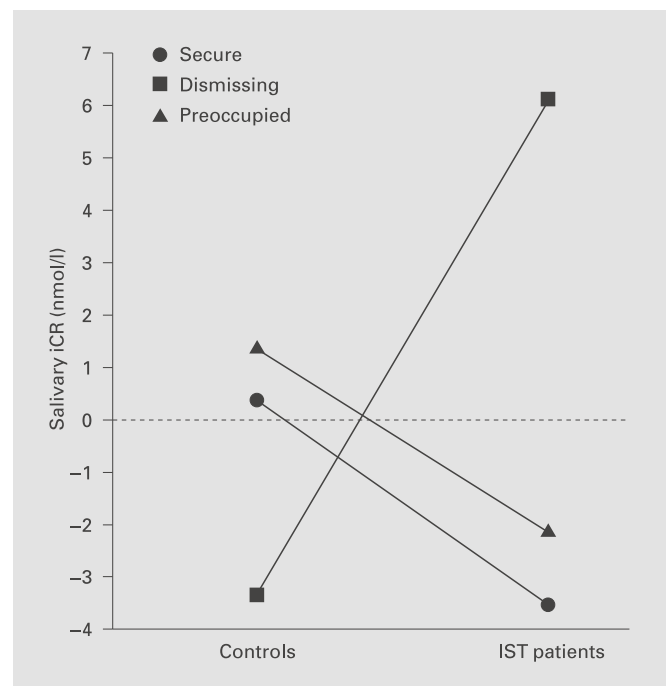


Fig. 1. Distribution of attachment group classification in IST patients and controls.

Fig. 2. ICR to the AAI according to clinical status and attachment group.



2

The two-way ANOVA comparing clinical status by attachment group using the ICR as dependent variable resulted in a significant interaction effect ($F = 7.23$, $p = 0.003$). The main effects for attachment group and clinical status were not significant. IST patients with dismissing attachment revealed a significantly higher cortisol response than IST patients with secure attachment and than subjects of the control group with either secure or dismissing attachment (fig. 2).

Other Psychological Measures as Covariates of the Cortisol Response

Spearman correlation coefficients between the ICR and the SCL-90R and the TAS-20 subscales (table 3) showed a significant association between the initial cortisol response and the scale for obsessive compulsive symptoms ($r = 0.43$, $p = 0.01$). The correlation of the ICR and the scale for externally oriented thinking of the TAS-20 tended to be significant ($r = 0.30$, $p = 0.07$). No significant correlation existed between cortisol response and depression and anxiety. When these subscales (depression and anxiety) were entered as covariates into the ANOVA (ICR as dependent variable), no significant effect emerged. The interaction effect of attachment and clinical status remained significant ($F = 3.73$, $p = 0.038$).

Table 3. Spearman correlation coefficients of the ICR, SCL-90R and TAS-20

		AUC	p
SCL-90R	SL 1	0.02	n.s.
	SL 2	0.43	0.01
	SL 3	0.19	n.s.
	SL 4	0.27	n.s.
	SL 5	0.28	n.s.
	SL 6	0.22	n.s.
	SL 7	0.15	n.s.
	SL 8	0.10	n.s.
	SL 9	0.20	n.s.
	GSI	0.23	n.s.
TAS-20	IDE	-0.23	n.s.
	COM	-0.11	n.s.
	EOT	0.30	0.07
	TOT	0.07	n.s.

SCL-90R subscales: SL 1 = Somatization; SL 2 = obsessive-compulsive; SL 3 = interpersonal sensitivity; SL 4 = depression; SL 5 = anxiety; SL 6 = anger-hostility; SL 7 = phobic anxiety; SL 8 = paranoid ideation; SL 9 = psychoticism; GSI = Global Severity Index. TAS-20 subscales: IDE = difficulty identifying feelings; COM = difficulty describing feelings; EOT = externally oriented thinking; TOT = total score.

Table 4. Spearman correlation coefficients of the neurological signs with attachment dimensions and ICR

	Sev.	Rot.	Lat.	Ant.-ret.
Attachment Dimension				
Secure	-0.21	-0.17	-0.65**	0.15
Dismissing	0.19	0.27	0.53*	-0.09
Preoccupation	-0.22	-0.40	0.15	0.02
Deactivation	0.26	0.32	0.49*	-0.08
ICR	0.40	0.16	0.08	-0.22

Sev. = Severity of symptoms; Rot. = rotation; Lat. = laterocollis; Ant.-ret. = anteroretrocollis; * $p < 0.05$; ** $p < 0.01$.

Neurological Signs and Cortisol Response (IST Group)

There was no significant association between the ICR and any of the neurological signs (table 4).

Neurological Signs and Attachment Strategies (IST Group)

Laterocollis correlated negatively with secure ($r = -0.65$, $p < 0.01$) and positively with dismissing ($r = 0.53$, $p < 0.05$) and deactivating ($r = 0.49$, $p < 0.05$) attachment strategies. These correlations suggest a link between attachment strategies and the neurological symptoms, in particular with laterocollis.

Discussion

With regard to the hypotheses outlined in the introduction the results can be summarized as follows:

- (1) insecure attachment in IST is clearly more prevalent than in the non-clinical control group;
- (2) in IST, but not in the healthy control group, dismissing attachment representation predicts cortisol response to the AAI.

The prevalence of insecure attachment in IST will be discussed first.

Studies on attachment in clinical samples suffering from psychiatric disorders have in general reported a higher prevalence of insecure attachment patterns [33]. Only few studies so far have investigated attachment in patients suffering from physical illness. While the high proportion of insecure attachment is a convergent finding for both, the psychiatric and the physically ill, the distribution of the two insecure attachment patterns varies. Psychiatric samples yield an equally high rate of both, insecure dismissing and insecure preoccupied attach-

ment. In contrast, IST patients show a clearly higher rate of insecure dismissing attachment. To what factors may the high prevalence of insecure dismissing attachment in IST be attributed?

The correlations of attachment strategies with the neurological signs suggest an interplay of the neurological symptoms and attachment. Social withdrawal and isolation in response to a chronic physical illness may also affect the mental representation of attachment. On the other hand substantial evidence supports the assumption of a high ontogenetic continuity of attachment patterns [34–37]. Although the data of the study presented do not allow conclusions on the longitudinal personality development of IST patients, we tend to consider insecure dismissing attachment in IST as a feature of the premorbid personality development. Recent studies have reported a substantial prevalence of psychiatric symptoms *preceding* the onset of the neurological disorder in IST [38]. Insecure attachment might be a developmental predisposition of adult-onset psychopathology in this clinical group.

The second hypothesis outlined in the introduction referred to the correlation between attachment and the psychophysiological response to stress. Elevated cortisol response to the AAI was found in IST patients with dismissing attachment, but not in IST patients with secure attachment nor in subjects of the control group irrespective of their attachment status. Attachment status per se, therefore, does not predict the adrenocortical stress response to the AAI. This finding is in agreement with other studies reported in the literature. Hertsgaard et al. [39] observed that in the ‘strange situation’ cortisol concentrations did not differ between insecure avoidant and securely attached infants. Only toddlers classified as disorganized with regard to attachment yielded higher cortisol concentrations. In other studies insecure attachment only in combination with behavioural inhibition [40] or with high fearfulness [41] predicted elevated cortisol levels in response to the ‘strange situation’.

In adults various studies provided evidence that personality traits and characteristics of coping style such as a high level of denial, psychological defence and self-control are associated with a more pronounced and prolonged psycho-endocrine stress reaction [for review, see 42]. In contrast, variables such as social resonance, trustfulness and a self-concept of own competence correlated *inversely* with the cortisol response to stress [43]. It is noteworthy that those variables, which in the literature were reported to predict a high cortisol response to stress such as psychological defensiveness and self-control, are related to the concept of insecure dismissing attachment.

Two different explanations may account for higher levels of cortisol response in IST patients during the AAI: first, physiological arousal in response to stress in IST in general might be higher as compared to non-clinical subjects. This hypothesis has not been systematically investigated yet. However, Meares and Lader [44] reported that a mental stress task in IST patients significantly increased EMG activity and furthermore skin conductance was significantly and positively correlated with the EPI neuroticism score. However, since no control group was included and due to its small sample size the results of this study are only preliminary.

In the study presented only a distinct subgroup of IST patients showed an elevated cortisol response. This suggests that elevated levels of cortisol in IST result rather from specific factors than a generally higher physiological arousal.

To subjects with an insecure dismissing attachment organization the AAI is a specific challenge. The interview requires to give a coherent account of personal and emotionally toned experiences with attachment figures. This is particularly difficult for subjects with an insecure dismissing attachment representation, who display a high level of defensiveness and who have only restricted access to attachment experiences. The combination of insecure dismissing attachment with the distress, which is imposed by the neurological symptoms seems to result in higher endocrinological responses during the AAI.

Considering the clinical relevance of an elevated cortisol response it is not yet unequivocally established that a high cortisol response to stress is a pathogenetic factor for disease in humans. Ader and Cohen [45], discussing the question whether a conditioned elevation in corticoste-

rone levels is sufficient to attenuate antibody production or other immunological parameters, conclude that the literature fails to provide consistent evidence that stress-induced alterations in immunity are mediated by stimulation of adrenocortical activity. In particular there are no data available confirming a link between cortisol high response to stress and physical illness in humans. Animal models suggest that HPA hyperresponsiveness might be associated with a higher susceptibility to infectious diseases [46]. However, in IST a high prevalence of infectious diseases has not been observed. Thyroid disorder, e.g. Hashimoto thyroiditis, which in IST is more prevalent indeed [47], is compatible rather with low than with high HPA responsiveness, since auto-immune inflammatory processes are linked rather with low than with high cortisol levels [48]. Further studies on endocrinological processes in IST are necessary in order to clarify whether the HPA axis responsiveness has any specific relevance for the condition at all.

A limitation of the study presented concerns the classification of attachment, which in fact is more elaborate than the three main attachment groups considered. A fourth category labeled as unresolved/disorganized with respect to trauma [49, 50] is also of particular clinical importance. Subjects in this category are disorganized in behaviour and/or cognitive processes due to the experience of trauma. The Q-sort methodology used in the study does not allow a classification of the narratives with regard to the U category. Considering that trauma may have long lasting influences on the HPA axis, the inclusion of the U/d category would certainly be a valuable extension for future investigation on the link between attachment and psychophysiological processes.

References

- 1 Coe CL, Wiener SG, Rosenberg LT, Levine S: Endocrine and immune responses to separation and mental loss in nonhuman primates; in Reite M, Field T (eds): *The Psychobiology of Attachment and Separation*. Orlando, Academic Press, 1985, pp 223–255.
- 2 Coe CL: Psychosocial factors and immunity in nonhuman primates: A review. *Psychosom Med* 1993;55:298–308.
- 3 Hofer MA: The effects of brief maternal separations on behavior and heart rate of two week old rat pups. *Physiol Behav* 1973;10:423–427.
- 4 Hofer MA: Relationships as regulators: A psychobiologic perspective on bereavement. *Psychosom Med* 1984;46:183–197.
- 5 Hofer MA: Hidden regulators in attachment, separation and loss. *Soc Res Child Dev* 1994; 59:192–207.
- 6 Reite M, Boccia ML: Physiological aspects of adult attachment; in Sperling MB, Berman WH (eds): *Attachment in Adults: Clinical and Developmental Perspectives*. London, Guilford, 1994, pp 98–127.
- 7 Bowlby J: *Attachment and Loss*. New York, Basic Books, 1969, vol 1: Attachment.
- 8 Spangler G, Schieche M, Ilg U, Maier U, Ackermann C: Maternal sensitivity as an external organizer for biobehavioral regulation. *Dev Psychobiol* 1994;27:425–437.
- 9 Ainsworth MDS, Blehar M, Waters E, Wall S: *Patterns of attachment*. Hillsdale, Erlbaum, 1978.
- 10 Spangler G, Grossmann KE: Biobehavioral organization in securely and insecurely attached infants. *Child Dev* 1993;64:1439–1450.
- 11 Schieche M, Spangler G: Biobehavioral organization in one-year-olds: Quality of mother-infant attachment and immunological and adrenocortical regulation. *Psychol Beitr* 1994; 36:30–35.
- 12 Dozier M, Kobak RR: Psychophysiology in attachment interviews: Converging evidence for deactivating strategies. *Child Dev* 1992;63: 1473–1480.
- 13 Carpenter EM, Kirkpatrick LA: Attachment style and presence of a romantic partner as moderators of psychophysiological responses to a stressful laboratory situation. *Pers Relationships* 1996;3:351–367.
- 14 Csala B, Deuschl G: Craniocervicale Dystonien: Pragmatischer Sammelbegriff oder nosologische Einheit? *Nervenarzt* 1994;65:75–94.

- 15 Lücking CH: Phasische und tonische Bewegungsstörungen des Torticollis und der Torsiondystonie. *Verhandlungen der Deutschen Gesellschaft für Neurologie*. Berlin, Springer, 1980, vol 1, pp 144–155.
- 16 Tempel LW, Perlmutter JS: Abnormal vibration-induced cerebral blood flow responses in idiopathic dystonia. *Brain* 1990;113:691–707.
- 17 Nickel T, Heinen F, Scheidt CE, Rayki O, Wisel J, Poewe W, Benecke R, Gasser T, Oertel W, Dengler R, Deuschl G: Spasmodic torticollis – A multicenter study on behavioral aspects. III. Psychosocial changes and coping. *Behav Neurol* 1996;9:89–95.
- 18 Scheidt CE, Heinen F, Nickel T, Rayki O, Wisel J, Poewe W, Benecke R, Arnold G, Oertel W, Dengler R, Deuschl G: Spasmodic torticollis – A multicenter study on behavioural aspects. IV. Psychopathology. *Behav Neurol* 1996;9:97–103.
- 19 Scheidt CE: Klinische und psychometrische Befunde beim spasmodischen Torticollis. *Psychother Psychosom Med Psychol* 1995;45:183–191.
- 20 Heinen F, Scheidt CE, Nickel T, Rayki O, Wisel J, Poewe W, Benecke R, Arnold G, Oertel W, Dengler R, Deuschl G: Spasmodic torticollis – A multicenter study on behavioural aspects II. Signs, symptoms and course. *Behav Neurol* 1996;9:81–88.
- 21 George C, Kaplan N, Main M: Adult Attachment Interview. Berkeley, University of California, 1985 (unpublished manuscript).
- 22 Main M, Goldwyn R: Adult Attachment Coding System. Berkeley, University of California, 1985–1996 (unpublished manuscript).
- 23 Kobak RR: Adult Attachment Q-Sort. University of Delaware, 1993 (unpublished manuscript).
- 24 Kobak RR, Cole HE, Ferenz-Gillies R, Fleming WS, Gamble W: Attachment and emotion regulation during mother-teen problem solving: A control theory analysis. *Child Dev* 1993;64:221–245.
- 25 Hubert W, de Jong-Meyer R: Emotional stress and saliva cortisol response. *J Clin Chem Clin Biochem* 1989;27:235–237.
- 26 Brandtstädter J, Baltes-Götz B, Kirschbaum C, Hellhammer D: Developmental and personality correlates of adrenocortical activity as indexed by salivary cortisol: Observation in the range of 35 to 65 years. *J Psychosom Res* 1991;35:173–185.
- 27 Dressendorfer RA, Kirschbaum C, Rhode W, Stahl F, Strasburger CJ: Synthesis of cortisol biotin conjugate and evaluation as tracer in an immunoassay for salivary cortisol measurement. *J Steroid Biochem Mol Biol* 1992;43:683–692.
- 28 Derogatis LR: SCL-90: Administration and Procedures Manual-I for the R(evised) Version. Baltimore, Clinical Psychometrics Research, 1977.
- 29 Derogatis LR: SCL-90 R. CIPS, Internationale Skalen für Psychiatrie. Weinheim, Beltz, 1986.
- 30 Bagby RM, Parker JDA, Taylor GJ: The twenty-item Toronto-Alexithymia Scale. I. Item selection and cross-validation of the factor structure. *J Psychosom Res* 1994;38:23–32.
- 31 Bagby RM, Taylor GJ, Parker JDA: The twenty-item Toronto-Alexithymia Scale: II. Convergent, discriminant and concurrent validity. *J Psychosom Res* 1994;38:33–40.
- 32 Tsui JKC, Eisen A, Stoessl AJ, Calne S, Calne DB: Double-blind study of botulinum toxin in spasmodic torticollis. *Lancet* 1986;2:245–247.
- 33 Van Ijzendoorn MH, Bakermans-Kranenburg MJ: Attachment representations in mothers, fathers, adolescents, and clinical groups: A meta-analytic search for normative data. *J Consult Clin Psychol* 1996;64:8–21.
- 34 Hamilton CE: Continuity and discontinuity of attachment from infancy through adolescence. Poster presented at the Biennial Meeting of the Society for Research in Child Development, Indianapolis, 1995.
- 35 Main M, Cassidy J: Categories of response with the parent at age six: Predicted from infant attachment classification and stable over a one-month period. *Dev Psychol* 1988;24:415–426.
- 36 Wartner UG, Grossmann K, Fremmer-Bombik E, Suess G: Attachment patterns at age six in South Germany: Predictability from infancy and implications for preschool behavior. *Child Dev* 1994;65:483–494.
- 37 Waters E, Merrick SK, Albersheim L, Treboux D: Attachment security from infancy to early adulthood: A 20-year longitudinal study. Poster presented at the Biennial Meeting of the Society for Research in Child Development, Indianapolis, 1995.
- 38 Wenzel T, Schnider A, Wimmer A, Steinhoff N, Moraru E, Auff E: Psychiatric comorbidity in patients with spasmodic torticollis. *J Psychosom Res* 1998;44:687–690.
- 39 Hertzsgaard L, Gunnar M, Erickson MF, Nachmias M: Adrenocortical responses to the strange situation in infants with disorganized/disoriented attachment relationships. *Child Dev* 1995;66:1100–1106.
- 40 Nachmias M, Gunnar M, Mangelsdorf S, Parritz RH, Buss K: Behavioral inhibition and stress reactivity: The moderating role of attachment security. *Child Dev* 1996;67:508–522.
- 41 Gunnar MR, Brodersen L, Nachmias M, Buss K, Rigatuso J: Stress reactivity and attachment security. *Dev Psychobiol* 1996;29:191–204.
- 42 Biondi M, Picardi A: Psychological stress and neuroendocrine function in humans: The last two decades of research. *Psychother Psychosom* 1999;68:114–150.
- 43 Kirschbaum C, Prüssner JC, Stone AS, Federenko I, Gaab J, Lintz D, Schommer N, Hellhammer DH: Persistent high cortisol responses to repeated psychological stress in a subpopulation of healthy men. *Psychosom Med* 1995;57:468–474.
- 44 Meares R, Lader M: Electromyographic studies in patients with spasmodic torticollis. *J Psychosom Res* 1971;15:13–18.
- 45 Ader R, Cohen N: The influence of conditioning on immune responses; in Ader R, Felten DL, Cohen N (eds): *Psychoneuroimmunology*, ed 2. New York, Academic Press, 1991, pp 611–646.
- 46 Biondi M, Zannino LG: Psychological stress, neuroimmunomodulation, and susceptibility to infectious diseases in animals and man: A review. *Psychother Psychosom* 1997;66:3–26.
- 47 Duane DD: Spasmodic torticollis: Clinical and biological features and their implications for focal dystonia. *Adv Neurol* 1988;50:473–492.
- 48 Munck A, Guyre PM: Glucocorticoids and immune function; in Ader R, Felten DL, Cohen N (eds): *Psychoneuroimmunology*, ed 2. New York, Academic Press, 1991, pp 447–474.
- 49 Main M, Hesse E: Parents' unresolved traumatic experiences are related to infant disorganized attachment status: Is frightened and/or frightening parental behavior the linking mechanism? in Greenberg M, Cicchetti D, Cummings EM (eds): *Attachment in the Preschool Years*. Chicago, University of Chicago Press, 1990, pp 161–182.
- 50 Main M, Solomon J: Discovery of a new, insecure-disorganized/disoriented attachment pattern; in Brazelton TB, Yogman M (eds): *Affective Development in Infancy*. Norwood, Ablex, 1986, pp 95–124.